

HW3 (Due 2018/03/26)

1. An integer is said to be a **perfect number** if the sum of its divisors, including 1 (but not the number itself), is equal to the number. For example, 6 is a perfect number, because $6 = 1 + 2 + 3$. Write a C++ program to print all the perfect numbers between 2 to n ($n \leq 10000$), and list the divisors of each perfect number.

Example : (The italics for program output and boldfaces for user input)

Please input an integer n: **1000**

Perfect number(s) between 2 and 1000:

$6 = 1 + 2 + 3$

$28 = 1 + 2 + 4 + 7 + 14$

$496 = 1 + 2 + 4 + 8 + 16 + 31 + 62 + 124 + 248$

Bonus:

Write a function ***int IsPrefect (int number)*** to determine whether parameter ***number*** is a perfect number. The function returns 1 if ***number*** is a perfect number, and 0 otherwise. Use this function to complete your program.

2. For n in \mathbf{Z}^+ , $n \geq 2$, the Euler's phi function $\phi(n)$ is the number of positive integers m , where $1 \leq m < n$ and $\gcd(m, n) = 1$. For example, $\phi(2)=1$, $\phi(3)= 2$, $\phi(4) = 2$, $\phi(5) = 4$ and $\phi(6) = 2$. Write a C++ program to find $\phi(n)$ for a given n , where $2 \leq n \leq 32767$, and list the integers m , where $1 \leq m < n$ and $\gcd(m, n) = 1$

Example : (The italics for program output and boldfaces for user input)

Please input an integer n: **6**

Euler's phi function of 6 is 2,

where $\gcd(6,1)=1$ and $\gcd(6,5)=1$.

Bonus:

Write a function ***int IsPrimeToEach(int m, n)*** which returns 1 if $\gcd(m, n) = 1$ and 0 if $\gcd(m, n) \neq 1$. Use this function to complete your program.